

**UNITED STATES DEPARTMENT OF COMMERCE  
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
08/937,721	09/25/97	GESSERT	T NREL-96-48

023712 MMC2/1011  
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EXAMINER

MULPURI, S

ART UNIT

PAPER NUMBER

2812

DATE MAILED: 10/11/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

# Office Action Summary

Application No.  
08/937,721

Applicant(s)

Gessert

Examiner

S. Mulpuri

Group Art Unit  
2812



☒ Responsive to communication(s) filed on Jul 25, 1900

☒ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

## Disposition of Claims

☒ Claim(s) 1, 2, and 4-6 is/are pending in the application.

Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

☐ Claim(s) \_\_\_\_\_ is/are allowed.

☒ Claim(s) 1, 2, and 4-6 is/are rejected.

☐ Claim(s) \_\_\_\_\_ is/are objected to.

☐ Claims \_\_\_\_\_ are subject to restriction or election requirement.

## Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on \_\_\_\_\_ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some\* ☐ None of the CERTIFIED copies of the priority documents have been  
☐ received.

☐ received in Application No. (Series Code/Serial Number) \_\_\_\_\_

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\*Certified copies not received: \_\_\_\_\_

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

## Attachment(s)

☐ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). \_\_\_\_\_

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

Application/Control Number: 08/937721

Page 2

Art Unit:

### DETAILED ACTION

This action is in response to the applicant response filed on 7/25/00.

#### *Claim Rejections - 35 USC § 103*

Claims 1,2 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted prior art in combination with Schroen et al.

Rejection is maintained same as in paper no. 17, mailed on 5/18/00.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted prior art Schroen et al as applied to claims 1-,2,4 above, and further in view of Lee et al.

Rejection is maintained same as in paper no. 17, mailed on 5/18/00

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted prior art in combination with Schroen et al as applied to claims 1,2 and 4 above, and further in view of Ebe et al.

Rejection is maintained same as in paper no. 17, mailed on 5/18/00.

Applicant's arguments filed on 7/25/00 have been fully considered but they are not persuasive.

Response to the arguments: Applicant argument are similar to the previous arguments.

Applicant amend the claims by adding a single word "polycrystalline" before "polycrystalline p-type CdTe"5/17/00. However Schroen et al clearly mention that Schroen et al invention is equally applicable to both single crystalline and polycrystalline semiconductors such as II-VI(see col. 6, lines 22-30, claim 1, step c). The concept and the purpose of Schroen et al of

Art Unit:

Ar irradiation for surface cleaning and activation on II-VI semiconductor materials is similar to the concept and purpose of instant invention.

Applicant amended the claims to limit p-type CdTe surface and dry etching technique. However, admitted Prior Art discloses forming solar cells from single crystalline materials, amorphous material or polycrystalline materials(see page 3, lines 1-9, page 12-20) and wet etching and dry etching (see page 6, lines 6-14).

Applicant argues that admitted prior art does not disclose a dry "etch process" from providing a uniform and reproducible surface of low-resistance electrical contact between metal layer and a layer polycrystalline p-type CdTe prior to additional contact interface or semiconductor layer to reduce contact resistance. However, modified invention of admitted prior art, as modified by the teachings of Schroen et al for Ar irradiation, Lee et al for aperture of 3 nm diameter and Ebe et al for angular irradiating of Ar on the target.

Admitted art teaches of forming solar cell metallization on II-VI semiconductor compound, could be p-type CdTe layer. Schroen et al et al is simply relied on Ar irradiation on surface p-type CdTe. It is agreed with applicant Schroen et al exemplifies the process with Si. However, Schroen et al clearly mention inventive concept of irradiation includes II-VI compounds.

Applicant argues that Schroen et al uses high voltage 1-10 keV which includes recite voltages, which is 50-2000 electron volts.

Art Unit:

It is agreed that Schroen et al grows silicon oxide, minimum of 10 angstroms, prior to metal formation. However, Schroen et al obtains synergistic advantage by both Ar irradiation and silicon oxide as well for reducing the contact resistance. However, Admitted prior art, as modified by Schroen et al, would completes, subsequent to irradiation of Ar, the structure forming metal on p-type CdTe.

Applicant argues that Lee et al uses external plasma gun and no reference to condition polycrystalline p-CdTe surface prior to deposition of an additional semiconductor layer. However, Lee et al is relied on the teaching of plasma apparatus with aperture diameter of 3 cm for bombarding Ar ions on substrate for effective Ar irradiation. It does not matter whether Lee et al uses glow discharge in the presence of inert gas, or forming oxide instead of metal or semiconductor layer, which are irrespective claimed language.

Applicant argues that teachings of Ebe et al is nonrelavent to the instant invention. However, the purpose of the Schroen et al and Abe et al is to reduce contaminants by using Ar irradiation. It does not matter whether the substrate is semiconductor or other, angle implantation of Ar is preferred, when taken the efficiency of sputtering into account Ebe et al further teach angle depends on the kind of inert ions and material of the substrate.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Morita disclose angle implantation of Ar ions. Wotherspoon teaches etching of CdTe layer.

Application/Control Number: 08/937721

Page 5

Art Unit:

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136a.

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to S. Mulpuri whose telephone number is (703) 305-5184. The fax phone number for the organization where this application or proceeding is assigned is (703) 305-3432.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4900.

  
**SAVITRI MULPURI**  
**PRIMARY EXAMINER**